International Energy Agency
2006 Standard Review of Portugal

ENERGY AREA POLICIES AND MEASURES FOR PERIOD 2004/2005

On 24 October 2005, the *National Energy Strategy* was approved, substituting for the previous 2003 strategy. The strategy defines the major political guidelines and most relevant measures in the energy area, with the following principal objectives:

- To guarantee security of energy supply, by diversifying primary resources and energy services and promoting energy efficiency.
- To stimulate and encourage competition, protecting consumers and promoting corporate competitiveness and efficiency.
- To guarantee the environmental adequacy of the energy process as a whole, reducing its environmental impacts on a local, regional and national level.

The major strategic guidelines, established to achieve these three objectives, include the liberalisation of the electricity, gas and fuel markets; creation of a competitive structural framework; growth of renewable energy supply; promotion of energy efficiency; an efficient and environmentally sound public supply of energy; reorganisation of the energy sector tax and incentive systems; energy perspective and innovation; and communication, awareness and assessment of national energy strategy.

The new strategy provides for the restructuring of the energy sector, by expanding the scope of activity of the principal operating companies, for there to be more than one relevant integrated operator in the electricity and natural gas sectors. It also provides for the linkage of the regulated assets in the natural gas sector (reception, transport and storage) with the current electricity grid and transport operator Rede Eléctrica Nacional (REN).

GENERAL ENERGY POLICY

Institutional organisation of energy sector

Many changes have taken place recently, reorganising government oversight of the energy sector. The Ministry of the Economy and Innovation (MEI) was created on 15 April 2006, eliminating the Ministry of Economic Activities and Labour. MEI supervises the energy sector, working particularly closely with the ministries responsible for the environment (MAOTDR), transport (MOPTC) and science and technology (MCTES).

MEI's responsibilities in the energy area are performed through Directorate-General for Geology and Energy (DGGE), Regional Economy Directorates (DREs), National Institute of Engineering, Technology and Innovation (INETI), Emergency Energy Planning Commission (CPEE) and Energy Services Regulatory Body (ERSE).

DGGE, whose implementing legislation was approved on 14 January 2006, is the result of the merger between the former Geological and Mining Institute and Directorate-General for Energy. Its energy area attributes remain essentially unchanged from those of the former Directorate-General for Energy.

The energy sector responsibilities of DREs (as established on 6 January 2006), INETI (as established on 3 March 2006) and ERSE in the licensing, research and regulatory areas, respectively, remain essentially unchanged. In local government terms, the competence for licensing fuel storage was given to the municipal authorities.

Also dependent on MEI is EGREP (the strategic oil products reserve management body), whose operations began in the second half 2004 and which is responsible for one-third of the total reserves obligation.

Tax on energy in 2005

The standard VAT rate was increased from 19% to 21% on 1 July 2005. The reduced rate of 5%, levied on natural gas and electricity for household use, was retained. The intermediate rate of 12% on diesel fuel for heating and fuel oil with low sulphur content for industry was also retained. Energy taxes for 2005 are detailed in Table 1

Table 1: Taxes in 2005*

Fuel	Excise taxes (EUR/unit)	VAT (%)
Electricity for household use	-	5
Electricity for industrial use	-	5**
Natural gas for household use	-	5
Natural gas for industrial use	-	5**
Gasoline (Pb =< 0.013 g/ℓ)	532 95/1 000 litres	21
Gasoline (Pb > 0.013 g/ℓ)	563 98/1 000 litres	21
Petroleum	308 29/1 000 litres	21
Road diesel	314 41/1 000 litres	21***
Heating diesel	91 44/1 000 litres	12
Coloured and marked diesel	77 51/1 000 litres	21
Fuel oil (S < 1%)	15 30/1 000 kg	12
LPG for household use	7 48/1 000 kg	21
LPG for industrial use	-	21**
LPG for automotive use	102 00/1 000 kg	21

*After revision of 10 June 2005. **Tax fully refundable. ***50% of tax refundable for companies.
Notes: Pb=lead, S=sulphur.
Source: DGGE.

Energy supply and demand forecasts

Since its 2004 in-depth policy review, no new forecasts on energy supply and demand have been produced. However, work on the introduction of medium- and long-term energy consumption forecasting methodologies began in 2005, when the market allocation model was chosen. The Markal model, as it is commonly known, is a general energy system linear programming model designed as a decision-aiding tool for its quantification of the effects of policy changes in a competitive market. The reference energy scenario is still being characterised.

ENERGY SUPPLY AND DEMAND

Total primary energy supply (TPES) in Portugal was 27.3 million tonnes of oil equivalent (Mtoe) in 2005,[1] a 2.8% rise over 2004 and an 8% rise over 2000. Since 2000, the absolute increase in natural gas supply makes up the lion's share of the total increase in TPES – the 1.7 Mtoe rise in natural gas is equivalent to more than 85% of the total TPES rise, dwarfing small increases in renewables supply, as well as modest changes in oil and coal supply. Energy supply from solar and wind more than quintupled between 2000 and 2005, but grew by only 0.15 Mtoe in absolute terms. In 2005, TPES by fuel broke down to 59% from oil, 14% from natural gas, 12% from coal, 11% from combustible renewables and waste and 2% from renewables (including hydro, solar, wind and geothermal).

Total final consumption (TFC) of energy in Portugal was 21 Mtoe in 2004, a rise of 2.3% over 2003 and 5.5% above 2000. The largest absolute increase since 2004 came from the transport sector, which increased consumption by 0.8 Mtoe, a 12% rise. Residential consumption grew 0.4 Mtoe, 14%, over the period. Total industrial consumption declined by 0.4 Mtoe, nearly 5%. As a share of total TFC, in 2004, 38% of consumption was in the industrial sector, 35% in the transport sector, 15% in the residential sector and the remainder, 12%, was in other sectors, including the commercial sector.

ENERGY AND ENVIRONMENT

Portugal's Kyoto target is to keep its annual greenhouse gas emissions during the first commitment period (2008 to 2012) to no more than 27% above Portugal's 1990 emissions. The *National Programme for Climate Change* (PNAC) was approved in 2004. PNAC quantifies Portugal's necessary reductions to comply with its Kyoto target and details policies and measures for all activity sectors. There is a particular focus on the energy sector (excluding transport), which will account for between 18% and 24% of the national reduction. Measures related to renewable energy sources and energy efficiency improvements will play a key role in meeting Portugal's target. Apart from measures taken in the energy sector, additional measures are expected to achieve a reduction of 5.9 million tonnes of CO_2 ($MtCO_2$) emissions.

Following the establishment of PNAC, in 2005 two new monitoring and assessment entities were created within PNAC: the *Monitoring and Assessment Programme* and the *National Inventory of Sources of Emissions and Removals of Atmospheric Pollution by Sinks*.

Under the *European Union Emissions Trading Scheme* (EU-ETS), the *National Plan for the Allocation of Greenhouse Gas Emissions Licences* (PNALE) was approved on 3 March 2006. Portugal is using the flexibility measures provided for in the Kyoto Protocol to meet half of its commitment.

DEMAND FOR ENERGY AND ENERGY EFFICIENCY

National economy and demand for energy

After the economic slowdown in 2003, the Portuguese economy resumed moderate growth in 2004, influenced by the prices of imported energy. There was a real increase in 2004 of around 1.1% in

[1] 2005 data are estimated throughout this review.

GDP, equivalent to the previous year's drop. The slowdown in the Portuguese economy in 2005, which stemmed from a marked reduction in domestic demand coupled with high external economic developments, including continued oil price rises. Average annual inflation continued to fall. The harmonised consumer price index (IHPC) was 3.3% in 2003, 2.5% in 2004 and 2.1% in 2005.

In broad terms, energy consumption continued to grow in Portugal, at above the EU average. In 2004, there was a 4.5% increase in electricity consumption in the residential, commerce and services sector and a 6.7% rise in the transport sector. There was an overall net increase of 3.5% in final electricity consumption.

Energy efficiency policy

Through its *Incentives Programme for the Modernisation of the Economy* (PRIME), the government has been backing projects to improve energy efficiency and promote efficient co-generation, in various sectors of economic activity, excluding the residential sector. Table 2 details project spending by area for 2004 and 2005. Funding allocation for the energy efficiency projects paid special attention to cost-benefit analysis.

Table 2: Energy Efficiency and CHP Projects, 2004 to 2005

Projects with PRIME support	Number of projects	Investment (million EUR)	Financial incentive (million EUR)	Annual energy savings (toe)	Installed power generating capacity (MW)
2004					
Cogeneration	8	12.13	1.68	15 880	18
Energy efficiency	27	4.98	2.20	4 247	0
Total	35	17.11	3.88	20 127	18
2005					
Cogeneration	2	4.86	0.14	19 242	5.9
Energy efficiency	25	6.74	3.31	4 323	0
Total	27	11.59	3.45	23 565	5.9
Total (2004-2005)	**62**	**28.71**	**7.33**	**43 692**	**23.9**

Source: DGGE.

Buildings

In 2004 and 2005 the *Energy Efficiency Programme in Buildings* was implemented. This policy covers the services and residential sectors, dealing with implementing technical energy efficiency standards and energy systems, with the objective of supporting energy policy for the sector.

The EU's directive on the energy performance of buildings requires member states to establish an energy certification system for buildings and a calculation methodology for buildings' energy performance. Portugal revised its current standards, with the two objectives.

The first objective is to revise the *Regulations on Characteristics of the Thermal Behaviour of Buildings* (RCCTE), which has been in force since 1991. Taking into account the requirements of new living standards, the aim is to address the need to control energy consumption by defining the planning rules for all new residential accommodation and services buildings without centralised air conditioning. The regulation was published on 4 April 2006.

The second objective is to revise the *Regulations on Air Conditioning Systems in Buildings* (RSECE), which has been in force since 1998, addressing the growing demand for air conditioning systems, with a view to the Kyoto Protocol commitments. The objectives of the regulations are to define thermal comfort for different areas inside buildings, improve overall energy efficiency in buildings, impose air conditioning efficiency rules and regularly monitor air conditioning maintenance procedures. The regulation was published on 4 April 2006.

Work on the preparation of a system for energy certification of buildings was also carried out. The resulting law, which was published on 4 April 2006, will complement former regulations and transpose the EU directive on the energy performance of buildings into national legislation.

Industry

Energy efficiency promotion is a strategic priority for Portugal, owing to its contribution to cost reduction and environmental impacts, and consequent increase in corporate productivity and quality of life. Energy efficiency is promoted in the industrial sector through the *Regulations for the Management of Energy Consumption* (RCGE).

Work has recently begun to revise the RGCE for industry, owing to the growing importance of environmental issues. The updated regulations will take into account analysis from the newly implemented EU-ETS.

Random energy audits have also been carried out on combined heat and power (CHP) plants to inspect their operating conditions, notably their compliance with the minimum equivalent electricity efficiency requirements and the requirements related to the use of thermal energy.

Transport

The Directorate-General for Terrestrial and Fluvial Transport (DGTTF) has promoted the introduction of environmentally friendly vehicles in the public transport sector, notably diesel vehicles using recent technology and vehicles propelled by alternative energies such as natural gas, biofuels, as well as hybrid and electric vehicles. It also participated in the European Commission's "Cute" programme, with three fuel cell buses in Porto. These actions have been accompanied by transport re-routing studies in urban centres.

Public transport services in Lisbon, Porto, Aveiro and Braga have several public vehicles running on natural gas. In particular, Porto has a fleet of 225 vehicles, the second largest natural gas fleet in Europe. The relatively low level of acceptance of natural gas-fuelled vehicles is associated with the fact that there are still an insufficient number of natural gas filling stations.

In 2004 and 2005, DGTTF demonstrated the use of hybrid vehicles in these cities to private taxi cab owners.

Demonstrations of electric minibuses have been given in Portugal's principal cities. DGTTF, in co-operation with local municipalities, has backed the creation of new urban routes using electric minibuses, referred to as "blue routes", in Bragança, Viana do Castelo, Viseu, Coimbra and Portalegre.

In other cities, DGTTF has also backed the creation of public routes using diesel-propelled minibuses and has given its support to studies on the use of hydrogen cells in the transport sector.

To raise energy efficiency through modified driving behaviour, the *Programme for the Energy and Environmental Optimisation of Passenger Urban Road Vehicle Fleets* (GISFROT II) was created. Furthermore, DGTTF is backing a project run by a road sector company, which involves the Instituto Superior Técnico (Lisbon Technical University). The project's aim is to monitor various driving parameters (*e.g.* instantaneous on-road consumption, different types of stoppage, engine idling) and to use the findings to help effect a 3% reduction in fuel consumption.

RENEWABLE ENERGY SOURCES

Pursuant to the *National Energy Strategy*, the use of renewable energy sources for electricity generation, particularly wind power, has risen. Under the 2001 EU directive on renewable electricity, renewable generation was to make up 39% of gross electricity consumption in 2010 in Portugal (renewable electricity targets vary by EU member). Wind power targets for 2010 have been increased to 5 100 MW. In 2005, a public tender for 1 800 megavolt ampere (MVA) in wind capacity was issued. A tender for the allocation of 15 thermal forestry biomass power stations with a total installed capacity of 100 MW has also been issued in 2006.

Table 3: Total Installed Renewable Generation Capacity, 2005

	By end 2005 (MW)
Wind	1 059
Hydro (>10 MW)	4 503
Small hydro (<=10 MW)	306
Biomass (with cogeneration)	12
Biomass (without cogeneration)	357
Biogas	8
Municipal solid waste	96
Wave/tidal	0
Photovoltaic	2
Geothermal	18
Total	**6 362**

Source: DGGE.

Current and projected renewable generation capacity is detailed in Table 3. In terms of total generation, 35.3% of total generation in 2005 came from renewable sources. In 2005, Portugal had the fifth-largest share of renewable electricity generation in the EU-15.

The EU directive on the promotion of the use of biofuels or other renewables fuels for transport was transposed into law on 21 March 2006. The national targets will be a 5.75% share of biofuels in transport fuels in 2010. The current law foresees the exemption of biofuels from the tax on oil products, when added to petrol and diesel for transport.

Renewable electricity generation

Poor hydro conditions have continued in Portugal, with water flows only 40% of average in 2004, close to the worst conditions of the last twelve years. The end of 2005 coincided with a period of 14

consecutive months where water flows were far below average. Generation from major hydro facilities was 52% lower in 2005 than in 2004. Small hydro facilities saw a drop of more than 40% as compared to 2004. In total, grid-connected hydro generation was 50% down in 2005 over 2004 and only made up 9% of national consumption.

At the same time, there was an increase of about 120% in wind power generation in 2005 over the previous year, with wind power generation exceeding small hydro generation for the first time. At the end of 2005, installed wind farm power generating capacity totalled 1 059 MW, made up of 118 wind farms.

Feed-in tariffs

Renewable energy feed-in tariffs for 2004 through 16 February 2005 are detailed in Table 4.

Table 4: Feed-in Tariffs for Renewable Electricity, 2004 to 16 February 2005

	Tariff (EUR/MWh)
Wind	
Up to 2 000 hours	92
2 000-2 200 hours	90
2 200-2 400 hours	88
2 400-2 600 hours	86
> 2 600 hours	83
Photovoltaic	
> 5 kW	310
<= 5 kW	510
Wave	300
Small hydro (< 10 MW)	80

Source: DGGE.

However, the method for defining the tariff rates was revised in February 2005 (see Table 5). In addition, allocation procedures for available capacity were modified, namely foreseeing the tender procedure, and the periods for building renewable power stations were shortened in order to get a higher rate of project implementation.

Table 5: Feed-in Tariffs for Renewable Electricity, from 17 February 2005

	Average tariff (EUR/MWh)	**Limit**
Wind	74	Up to 33 GWh or 15 years
Photovoltaic		
> 5 kW	310	Up to 21 GWh or 15 years; exceptions available for up to 25 years
<= 5 kW	450	Up to 21 GWh or 15 years; exceptions available for up to 25 years
Small hydro (< 10 MW)	75	Up to 42.5 GWh or 15 years
Forestry biomass	109	Up to 15 years; exceptions available for up to 25 years
Municipal solid waste	75	Up to 15 years
Landfill biogas	102	Up to 15 years

Source: DGGE.

COAL

In 2004, the cement industry used 42% less steam coal than in 2003. There was a further reduction of around 93% in 2005, owing to the growing use of petroleum coke. There was a 2.8% increase in the consumption of steam coal by thermoelectric power stations, in 2004 as compared to 2003.

OIL

Oil continues to play an essential role in the supply structure, comprising 58.3% of total primary energy consumption in 2004 compared with 71.4% in 1990.

Retail sales prices of unleaded gasoline and diesel fuels were liberalised in January 2004 and the maximum price regime was abolished. DGGE continues to monitor fuel prices, which it makes public weekly on its website while also providing information to the Competition Authority.

In December 2005, alterations were made to fuel specifications terms to reduce the sulphur content of gasoline and diesel, complying with the EU directive. The EU directive on the sulphur content of naval fuels is expected to be transposed by by the end of 2006

Portugal is currently in compliance with its IEA oil stockholding obligation, in addition to the relevant EU directives on oil reserves security. The government has authorised all new entrants in the oil market to maintain all mandatory reserves with the stockholding Agency Entidade Gestora de Reservas Estratégicas de Produtos Petrolíferos (EGREP), a policy change aimed at eliminating a barrier to new market operators and facilitating competition. (New entrants may have found difficulties building or renting storage capacity in the past). EGREP, whose operations began in 2004, is responsible for the maintenance of one-third of the operators' mandatory reserves, in addition to the additional volumes required to comply with IEA obligation. Oil market participants have been pleased to see the development of EGREP, as it reduces the total cost of keeping mandatory reserves.

Owing to the lack of suitable storage facilities in Portugal, the country was given EU permission to establish reserves in other EU member states, starting in March 2004.

NATURAL GAS

Natural gas has increased its share in the total the energy mix. In 2004 it made up 12% of total primary energy consumption, compared with 5% in 1994.

Electricity generation accounts for the highest proportion of natural gas consumption. After the third unit of the Ribatejo combined cycle power station came into operation in 2005, installed power generating capacity running on natural gas totalled 2 166 MW (compared with 1 776 MW for coal-fired power stations).

Two of the underground natural gas salt storage cavities developed by Transgás in Carriço, near Pombal, came into operation in 2005. The project, which began in 2000, plans for the development of four cavities, with useful storage of around 165 million cubic metres of natural gas. The third cavity has recently been completed and the fourth cavity is expected to be completed in 2007.

Transgás Atlântico's liquefied natural gas (LNG) terminal in Sines began operation in January 2004. As Portugal's first LNG terminal, the installation complements supplies through the Maghreb pipeline, therefore increasing physical security of supply and diversification of sources.

Natural gas has benefited from two measures of financial support under the PRIME programme, in force up to 2006. First, PRIME provides financial support for projects that convert facilities to natural gas (developed by gas transport and distribution companies), projects that convert road transport fleets to natural gas. Secondly, PRIME supports the modernisation and development of energy infrastructure.

On 15 February 2006 and 26 July 2006, the government published legislation that fully transposed the EU gas market directive, and established common rules for the internal natural gas market.

ELECTRICITY

Growth of total net electricity consumption in Portugal remained high in 2004, with an increase of 3.5% over 2003. Growth of electricity demand was higher than for energy as a whole and much higher than GDP growth.

Regulatory environment

The organisation of the national electricity system has significantly changed since the EU electricity market directive was transposed. Under the new legislation published in 2006, the former public electricity system and liberalised electricity system have merged to one unique liberalised system. The independence of the transmission system operator was further reinforced through limits on shareholder ownership. From 4 September 2006, all Portuguese electricity consumers are free to choose their supplier. In order to guarantee universal service, a supplier of last resort was created. An independent regulator (Entidade Reguladora dos Serviços Energéticos, ERSE) guarantees adequate protection to consumers.

A new licensing procedure for new capacity was established with clear authorization criteria that favour competition and diversification of electricity supply.

Evolution of national electricity grid

The national transport grid (RNT) was further reinforced, in 2004 and 2005, with the objective of improving internal transport conditions and reinforcing connection capacities with the Spanish grid as a fundamental condition for establishing the Iberian electricity market (MIBEL).

In 2004, a second 400-kV line came into service in the northern zone, Alto-Lindoso-Cartelle. In the southern zone, the 400-kV Alqueva-Balboa line connection was added, which increased the import/export capacity with the Spanish grid and improved overall grid security. The second units of both the Ribatejo thermoelectric power station (392 MW) and the Alqueva hydroelectric power station (130 MW) came into service in January 2004, and are connected to the 400-kV grid. Portugal has also invested in its grid infrastructure in order to accommodate new wind farms and the coming into service of the third Ribatejo power station unit.

MIBEL

In June 2003, the Portuguese side of the Iberian electricity market operator (Operador do Mercado Ibérico polo Português, OMIP) was established, being responsible for the electricity forward and derivatives market. Its Spanish counterpart, Operador de Mercado Ibérico, polo Espanol, (OMIE; which corresponds to the existing OMEL[2]), will be responsible for the spot market. OMIP owns the full amount of the capital of OMIClear (Sociedade de Compensação de Mercados de Energia). One-tenth of OMEL's shares were acquired by OMIP (90% of which is owned by REN) in 2004, and OMEL has acquired 10% of OMIP's share capital. The technological platform for the spot market began operation in April 2004, followed by the testing of the trading and clearing system, involving a large number of Iberian operators in the electricity and financial sectors.

The MIBEL international agreement came into force during the first half of 2006. OMIP began operation on 3 July 2006, in line with the agreed date under the 21st Portugal-Spain summit, held in Évora, on 18 and 19 November 2005. The minimum percentage of electricity that regulated suppliers (*comercializadores*) must acquire from OMIP, in the second half of 2006, was also defined. (Only the supplier of last resort must buy at least 5% of its electricity from OMIP/OMI-Clear, in the second half of 2006.) A decision was also made to create two new connections: Algarve-Andalusia and a north-west international connection. In addition, the system operator will study a proposed north-east international connection.

RESEARCH, DEVELOPMENT AND DEMONSTRATION

The Ministry of Science, Technology and Higher Education is responsible for national R&D policy. In July 2006, the government set up a new funding programme to support projects justified by the need for a rapid scientific and technological development in the country, in all scientific domains, and the area of energy was included. However, energy funded scientific projects, approved in 2004 and to be implemented in 2005, accounted for less than 1% of the total programme budget, having 17 energy projects approved out of a total of 1 158 funded projects. The overall amount allocated to the programme (labour costs are not considered) was nearly EUR 90 million, with about EUR 800 000 allocated to the implementation of energy projects. However, there might be energy-related projects in other areas not included in the total, such as those related to the environment and climate change, as well as to mechanical and chemical engineering.

Efforts have been developed to improve co-operation between different ministries, namely the Ministry of Economy and Innovation; the Ministry of Science, Technology and Higher Education; the Ministry of Environment, Planning and Regional Development; and the Ministry of Infrastructure, Transport and Communications. Synergies and partnerships have also been implemented that strengthen the collaboration between state R&D departments, universities, technological centres and private companies, for the implementation of actions to support the goals set up by the energy policy. Apart from the implementation of research for demonstration projects, collaboration was also set up between the National Laboratory for Industry, Technology and Innovation (INETI) and the Faculty of Sciences of the University of Lisbon, structuring a course for a university degree on energy and environment.

[2] According to an April 2004 parliament resolution.

The total public R&D budget remains low, maintained annually at around EUR 2-3 million. *Energy and Changes Towards Sustainability* is 100% funded by the government through *Programme for Development Investments and Expenditure in Public Administration* (PIDDAC), developing projects with four main objectives: to promote the use of endogenous and renewable energy sources, to increase energy efficiency in buildings and industry, to ensure a better balance with relation to energy and environment and to develop new energy vectors, mainly hydrogen (and fuel cells). In 2005, total funding, covering both research and demonstration projects, was around EUR 910 000, of which EUR 650 000 was spent on finalising the construction of a demonstration solar energy and self-sustained building that was installed in the department of renewable energy at INETI. Other demonstration energy projects were carried out under another PIDDAC area, *Environmental Valorisation for Sustainability*, focussing on the use of fluidised bed technology for combustion and pyrolysis of wastes, with a total budget in 2005 of EUR 1.25 million. The four demonstration projects were co-financed by PRIME, with 75% funded by the European Commission.

In terms of bridging fundamental research to technology application, Portugal participated in an EU ERA-Net project, co-ordinated by Germany's Julich Institute, with eight other countries and the Nordic Agency. The project works to establish co-operation between European research programmes, with an aim to identify and stimulate innovative energy technologies and unexpected breakthroughs in conventional energy technology fields.

With respect to nuclear R&D, Portugal focuses on nuclear fusion activities that are undertaken by the Nuclear Fusion Centre of the Associated Laboratory of the Technical University of Lisbon. Under the auspices of the Nuclear Fusion Centre, an experimental fusion plasma facility has been established. The Nuclear Fusion Centre also participates in international "ITER" project.

With the aim of improving the monitoring and evaluation of projects, and the use of programme evaluations in developing new projects, a new energy programme in PIDDAC is being defined, to be implemented from 2007 to 2011.

With respect to the collection of R&D data for IEA statistics, the Ministry of Economy and Innovation has undertaken efforts, through the DGGE and INETI jointly, to improve the efficiency of mechanisms and the format for its online publication for consultation by outside entities.

Portugal

Energy Balances and Key Statistical Data

Unit: Mtoe

SUPPLY		1973	1990	2003	2004	2010	2020	2030
TOTAL PRODUCTION		**1.40**	**3.39**	**4.34**	**3.90**	**5.64**	**..**	**..**
Coal[1]		0.13	0.12	-	-	-	..	..
Oil		-	-	-	-	-	..	..
Gas		-	-	-	-	-	..	..
Comb. Renewables & Waste[2]		0.64	2.48	2.85	2.88	3.79	..	..
Nuclear		-	-	-	-	-	..	..
Hydro		0.63	0.79	1.35	0.85	1.11	..	..
Geothermal		-	0.00	0.08	0.08	0.07	..	..
Solar/Wind/Other[3]		-	0.01	0.06	0.09	0.67	..	..
TOTAL NET IMPORTS[4]		**5.69**	**14.82**	**21.94**	**22.14**	**24.34**	**..**	**..**
Coal[1]	Exports	0.01	0.01	-	-	-	..	..
	Imports	0.28	3.00	3.27	3.21	3.07	..	..
	Net Imports	0.27	2.99	3.27	3.21	3.07	..	..
Oil	Exports	0.23	2.50	1.72	2.03	..	..	..
	Imports	6.44	14.93	18.08	17.75	17.51	..	..
	Bunkers	0.80	0.61	0.58	0.66	1.36	..	..
	Net Imports	5.42	11.82	15.79	15.07	16.15	..	..
Gas	Exports	-	-	-	-	-	..	..
	Imports	-	-	2.64	3.30	5.12	..	..
	Net Imports	-	-	2.64	3.30	5.12	..	..
Electricity	Exports	0.01	0.15	0.27	0.18	-	..	..
	Imports	0.01	0.15	0.51	0.74	-	..	..
	Net Imports	-0.00	0.00	0.24	0.56	-	..	..
TOTAL STOCK CHANGES		**0.14**	**-0.47**	**-0.50**	**0.51**	**-**	**..**	**..**
TOTAL SUPPLY (TPES)		**7.23**	**17.75**	**25.78**	**26.55**	**29.98**	**..**	**..**
Coal[1]		0.51	2.76	3.28	3.37	3.07	..	..
Oil		5.45	11.71	15.28	15.42	16.15	..	..
Gas		-	-	2.64	3.30	5.12	..	..
Comb. Renewables & Waste[2]		0.64	2.48	2.85	2.88	3.79	..	..
Nuclear		-	-	-	-	-	..	..
Hydro		0.63	0.79	1.35	0.85	1.11	..	..
Geothermal		-	0.00	0.08	0.08	0.07	..	..
Solar/Wind/Other[3]		-	0.01	0.06	0.09	0.67	..	..
Electricity Trade[5]		-0.00	0.00	0.24	0.56	-	..	..
Shares (%)								
Coal		*7.0*	*15.5*	*12.7*	*12.7*	*10.2*	..	..
Oil		*75.4*	*66.0*	*59.3*	*58.1*	*53.9*	..	..
Gas		-	-	*10.2*	*12.4*	*17.1*	..	..
Comb. Renewables & Waste		*8.8*	*14.0*	*11.0*	*10.9*	*12.6*	..	..
Nuclear		-	-	-	-	-	..	..
Hydro		*8.7*	*4.4*	*5.2*	*3.2*	*3.7*	..	..
Geothermal		-	-	*0.3*	*0.3*	*0.2*	..	..
Solar/Wind/Other		-	*0.1*	*0.2*	*0.3*	*2.2*	..	..
Electricity Trade		-	-	*0.9*	*2.1*	-	..	..

0 is negligible, - is nil, .. is not available

Please note: All forecasts are based on the 2003 submission.

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Portugal

Unit: Mtoe

DEMAND							
FINAL CONSUMPTION BY SECTOR	**1973**	**1990**	**2003**	**2004**	**2010**	**2020**	**2030**
TFC	**6.11**	**14.00**	**20.86**	**21.34**	**23.81**	**..**	**..**
Coal[1]	0.19	0.59	0.14	0.09	0.17	..	..
Oil	4.59	8.97	13.09	13.37	14.33	..	..
Gas	0.05	0.05	1.21	1.28	1.72	..	..
Comb. Renewables & Waste[2]	0.58	2.33	2.47	2.48	2.55	..	..
Geothermal	-	-	0.00	0.00	-	..	..
Solar/Wind/Other	-	0.01	0.02	0.02	0.06	..	..
Electricity	0.70	2.03	3.71	3.84	4.54	..	..
Heat	-	0.03	0.23	0.26	0.44	..	..
Shares (%)							
Coal	*3.1*	*4.2*	*0.7*	*0.4*	*0.7*	*..*	*..*
Oil	*75.1*	*64.0*	*62.7*	*62.7*	*60.2*	*..*	*..*
Gas	*0.8*	*0.4*	*5.8*	*6.0*	*7.2*	*..*	*..*
Comb. Renewables & Waste	*9.5*	*16.6*	*11.8*	*11.6*	*10.7*	*..*	*..*
Geothermal	*-*	*-*	*-*	*-*	*-*	*..*	*..*
Solar/Wind/Other	*-*	*0.1*	*0.1*	*0.1*	*0.3*	*..*	*..*
Electricity	*11.5*	*14.5*	*17.8*	*18.0*	*19.1*	*..*	*..*
Heat	*-*	*0.2*	*1.1*	*1.2*	*1.9*	*..*	*..*
TOTAL INDUSTRY[6]	**2.71**	**6.81**	**8.16**	**8.20**	**9.39**	**..**	**..**
Coal[1]	0.14	0.59	0.14	0.09	0.17	..	..
Oil	1.81	3.96	4.12	4.14	4.26	..	..
Gas	0.00	-	0.92	0.95	1.20	..	..
Comb. Renewables & Waste[2]	0.32	1.18	1.32	1.32	1.40	..	..
Geothermal	-	-	-	-	-	..	..
Solar/Wind/Other	-	-	-	-	-	..	..
Electricity	0.44	1.05	1.45	1.47	1.93	..	..
Heat	-	0.03	0.21	0.24	0.42	..	..
Shares (%)							
Coal	*5.1*	*8.7*	*1.7*	*1.1*	*1.8*	*..*	*..*
Oil	*66.9*	*58.2*	*50.5*	*50.4*	*45.4*	*..*	*..*
Gas	*0.1*	*-*	*11.3*	*11.5*	*12.8*	*..*	*..*
Comb. Renewables & Waste	*11.8*	*17.3*	*16.2*	*16.1*	*14.9*	*..*	*..*
Geothermal	*-*	*-*	*-*	*-*	*-*	*..*	*..*
Solar/Wind/Other	*-*	*-*	*-*	*-*	*-*	*..*	*..*
Electricity	*16.2*	*15.4*	*17.7*	*17.9*	*20.6*	*..*	*..*
Heat	*-*	*0.4*	*2.6*	*3.0*	*4.5*	*..*	*..*
TRANSPORT[7]	**1.95**	**3.82**	**7.26**	**7.45**	**8.27**	**..**	**..**
TOTAL OTHER SECTORS[8]	**1.46**	**3.37**	**5.45**	**5.68**	**6.16**	**..**	**..**
Coal[1]	0.04	0.00	-	-	-	..	..
Oil	0.87	1.21	1.76	1.83	1.85	..	..
Gas	0.05	0.05	0.28	0.33	0.52	..	..
Comb. Renewables & Waste[2]	0.26	1.15	1.15	1.16	1.15	..	..
Geothermal	-	-	0.00	0.00	-	..	..
Solar/Wind/Other	-	0.01	0.02	0.02	0.06	..	..
Electricity	0.25	0.95	2.23	2.33	2.56	..	..
Heat	-	-	0.01	0.02	0.02	..	..
Shares (%)							
Coal	*2.4*	*-*	*-*	*-*	*-*	*..*	*..*
Oil	*59.7*	*35.9*	*32.2*	*32.2*	*30.1*	*..*	*..*
Gas	*3.2*	*1.5*	*5.1*	*5.7*	*8.4*	*..*	*..*
Comb. Renewables & Waste	*17.9*	*34.1*	*21.1*	*20.4*	*18.7*	*..*	*..*
Geothermal	*-*	*-*	*-*	*-*	*-*	*..*	*..*
Solar/Wind/Other	*-*	*0.3*	*0.4*	*0.4*	*1.0*	*..*	*..*
Electricity	*16.8*	*28.1*	*40.9*	*41.0*	*41.6*	*..*	*..*
Heat	*-*	*-*	*0.2*	*0.3*	*0.3*	*..*	*..*

Portugal

Unit: Mtoe

DEMAND							
ENERGY TRANSFORMATION AND LOSSES	**1973**	**1990**	**2003**	**2004**	**2010**	**2020**	**2030**
ELECTRICITY GENERATION[9]							
INPUT (Mtoe)	**1.33**	**5.10**	**7.78**	**7.86**	**10.49**	**..**	**..**
OUTPUT (Mtoe)	**0.84**	**2.44**	**4.00**	**3.86**	**5.18**	**..**	**..**
(TWh gross)	9.79	28.36	46.52	44.83	60.20	..	..
Output Shares (%)							
Coal	*3.9*	*32.1*	*31.2*	*33.1*	*21.8*	..	..
Oil	*19.2*	*33.1*	*13.5*	*12.7*	*7.9*	..	..
Gas	-	-	*16.6*	*26.1*	*33.8*	..	..
Comb. Renewables & Waste	*2.0*	*2.4*	*3.6*	*4.0*	*3.0*	..	..
Nuclear	-	-	-	-	-	..	..
Hydro	*74.8*	*32.3*	*33.8*	*22.0*	*21.5*	..	..
Geothermal	-	*0.0*	*0.2*	*0.2*	*0.1*	..	..
Solar/Wind/Other	-	*0.0*	*1.1*	*1.8*	*11.8*	..	..
TOTAL LOSSES	**1.26**	**3.21**	**4.87**	**5.05**	**6.17**	**..**	**..**
of which:							
Electricity and Heat Generation[10]	0.49	2.63	3.55	3.75	4.69	..	..
Other Transformation	0.27	-0.38	-0.08	-0.05	-	..	..
Own Use and Losses[11]	0.51	0.96	1.40	1.35	1.48	..	..
Statistical Differences	**-0.15**	**0.53**	**0.05**	**0.17**	**-**	**..**	**..**
INDICATORS	**1973**	**1990**	**2003**	**2004**	**2010**	**2020**	**2030**
GDP (billion 2000 USD)	47.40	81.00	107.50	108.50	126.17	..	..
Population (millions)	8.72	10.00	10.44	10.52	10.62	..	..
TPES/GDP[12]	0.15	0.22	0.24	0.24	0.24	..	..
Energy Production/TPES	0.19	0.19	0.17	0.15	0.19	..	..
Per Capita TPES[13]	0.83	1.78	2.47	2.52	2.82	..	..
Oil Supply/GDP[12]	0.12	0.14	0.14	0.14	0.13	..	..
TFC/GDP[12]	0.13	0.17	0.19	0.20	0.19	..	..
Per Capita TFC[13]	0.70	1.40	2.00	2.03	2.24	..	..
Energy-related CO_2 Emissions (Mt CO_2)[14]	16.4	39.6	58.9	60.3	65.8	..	..
CO_2 Emissions from Bunkers (Mt CO_2)	3.5	3.5	3.8	4.2	6.8	..	..
GROWTH RATES (% per year)	**73-79**	**79-90**	**90-03**	**03-04**	**04-10**	**10-20**	**20-30**
TPES	5.5	5.4	2.9	3.0	2.0	..	..
Coal	-2.4	18.2	1.3	2.8	-1.6	..	..
Oil	6.1	3.8	2.1	0.9	0.8	..	..
Gas	-	-	-	25.3	7.6	..	..
Comb. Renewables & Waste	3.2	11.2	1.1	1.3	4.7	..	..
Nuclear	-	-	-	-	-	..	..
Hydro	7.3	-1.8	4.2	-37.2	4.6	..	..
Geothermal	-	-	28.5	-1.3	-1.8	..	..
Solar/Wind/Other	-	-	14.4	44.4	39.5	..	..
TFC	4.7	5.2	3.1	2.3	1.8	..	..
Electricity Consumption	8.5	5.3	4.8	3.5	2.8	..	..
Energy Production	4.4	5.9	1.9	-10.1	6.3	..	..
Net Oil Imports	8.1	2.9	2.2	-4.6	1.2	..	..
GDP	2.9	3.4	2.2	0.9	2.5	..	..
Growth in the TPES/GDP Ratio	2.5	1.9	0.7	2.0	-0.5	..	..
Growth in the TFC/GDP Ratio	1.8	1.7	0.9	1.3	-0.7	..	..

Please note: Rounding may cause totals to differ from the sum of the elements.

Footnotes to Energy Balances and Key Statistical Data

[1] Includes lignite and peat, except for Finland, Ireland and Sweden. In these three cases, peat is shown separately.

[2] Comprises solid biomass, liquid biomass, biogas, industrial waste and municipal waste. Data are often based on partial surveys and may not be comparable between countries.

[3] Other includes tide, wave and ambient heat used in heat pumps.

[4] Total net imports include combustible renewables and waste.

[5] Total supply of electricity represents net trade. A negative number indicates that exports are greater than imports.

[6] Includes non-energy use.

[7] Includes less than 1% non-oil fuels.

[8] Includes residential, commercial, public service and agricultural sectors.

[9] Inputs to electricity generation include inputs to electricity, CHP and heat plants. Output refers only to electricity generation.

[10] Losses arising in the production of electricity and heat at main activity producer utilities (formerly known as public) and autoproducers. For non-fossil-fuel electricity generation, theoretical losses are shown based on plant efficiencies of approximately 33% for nuclear, 10% for geothermal and 100% for hydro.

[11] Data on "losses" for forecast years often include large statistical differences covering differences between expected supply and demand and mostly do not reflect real expectations on transformation gains and losses.

[12] Toe per thousand US dollars at 2000 prices and exchange rates.

[13] Toe per person.

[14] "Energy-related CO_2 emissions" have been estimated using the IPCC Tier I Sectoral Approach. In accordance with the IPCC methodology, emissions from international marine and aviation bunkers are not included in national totals. Projected emissions for oil and gas are derived by calculating the ratio of emissions to energy use for 2004 and applying this factor to forecast energy supply. Future coal emissions are based on product-specific supply projections and are calculated using the IPCC/OECD emission factors and methodology.